

(continued from inside)

## The Argonne Technique

Argonne's process consists of dissolving the zinc coating from scrap in a hot, caustic solution and recovering the zinc from the solution electrolytically. The zinc-bearing scrap is charged in an electrolytic cell containing a 70–90°C sodium hydroxide solution. Applying an electric potential dissolves the zinc into the hot caustic. Clean scrap is removed, rinsed, and recycled. The electrolyte is then pumped into a second cell, where the zinc is electrolytically removed from the solution. The zinc can be sold to refiners for purification and resale.

The operating-cost benefits to the steelmaking industry of Argonne's technology are estimated to be \$140 million per year (compared with using non-scrap sources of iron). Environmental compliance costs would decrease by about \$150 million per year. Foreign import of zinc could also be reduced by some \$100 million per year.

Meretec has installed a 50,000-ton/yr pilot plant in East Chicago, Indiana. This plant has dezincing over 1,500 tons of automotive stamping waste, and tests have demonstrated that the process can remove not only zinc, but also many plastic coatings.



## ARGONNE NATIONAL LABORATORY

Argonne National Laboratory is committed to research and development leading to **high-quality, cost-effective products** that meet the nation's goal of improving energy efficiency, reducing emissions, and manufacturing affordable, advanced-technology vehicles.

The Laboratory has forged **partnerships** with many firms in the energy and transportation sectors over the past two decades. Our location, right in the nation's heartland and industrial center, makes cooperative research accessible and cost-effective.

Argonne's **innovative research in recycling** is helping to provide solutions to the challenges associated with today's and tomorrow's vehicles. These programs are supported by the Department of Energy and U.S. industry.

### For further information contact:

Ed Daniels  
Tel: (630) 252-5279 Fax: (630) 252-1342  
E-mail: [edaniels@anl.gov](mailto:edaniels@anl.gov) website: <http://pe.es.anl.gov>

Process Evaluation Section  
Argonne National Laboratory  
9700 South Cass Avenue, Argonne, Illinois 60439



Argonne National Laboratory is operated for the U.S. Department of Energy by The University of Chicago.

# RECOVERING & RECYCLING

## Automotive Waste



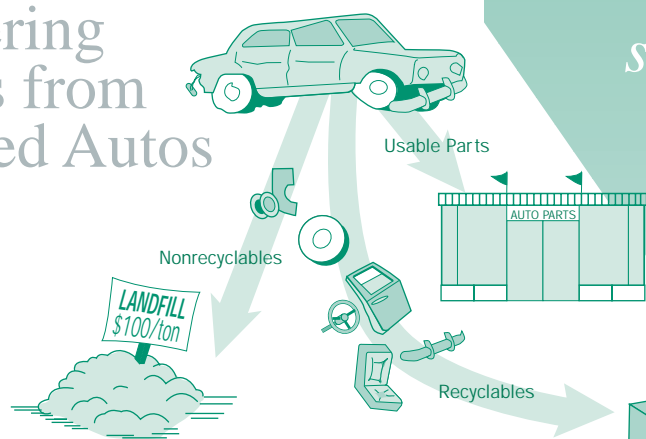
Working in Partnership  
with U.S. Industry

Recovering Materials from  
Auto Shredder Residue

Dezincing Galvanized Ferrous Scrap

ARGONNE NATIONAL LABORATORY

## Recovering Plastics from Scrapped Autos



Argonne is testing a technically promising, potentially economical process to recycle polymers and other constituents from automotive shredder residue (ASR). The plastics recovered through Argonne's process could be used in a variety of applications — one of the first might be polyurethane foam for carpet padding.

## The Argonne Technique

The Argonne technique for recycling ASR begins with mechanical/physical separation of the ASR into several fractions: polyurethane foam, which is separated and cleaned; iron-oxide-rich “fines,” which may be used by the cement industry as a source of iron oxide; and a plastics-rich stream. Argonne is developing an advanced froth-flotation process for selective recovery of certain plastics from the plastics-rich stream. If fines, foam, and plastics are recycled, as much as 75% of ASR could be diverted from landfills.

Full-scale implementation of Argonne's process would benefit the auto recycling industry. Auto shredders generate 3–5 million tons of ASR annually. The recycling of automotive plastics, which constitute about 20–30% of ASR by weight, is not currently practiced commercially.

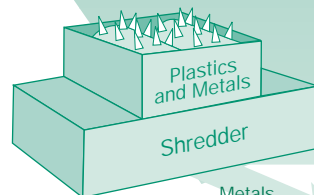
*Working with industry and industry-supported associations to identify, evaluate, and implement advanced recycling technologies*

The components are not recycled for several reasons, including the lack of a cost-effective technology for recovering plastics, potential contamination of the plastics with other materials from the ASR stream, and the absence of a strong market. Argonne's process has the potential to overcome these economic and technical hurdles.

A demonstration plant at a shredder site is now processing polyurethane foam. Plans are also under way to run a large-scale test using fines in cement.

## Recovering Zinc from Galvanized Scrap

Through a cost-sharing program with Meretec Corp., Argonne is developing a new technology for converting galvanized steel scrap from stamping



Rebar, Steel Sheets, Pellets

### Argonne Recycling Process

Potential Products from Recovered Plastics



plant wastes into clean scrap for steelmaking and recovery of the zinc. With further development, the technology could also be used to process galvanized steel scrap from obsolete automobiles.

Half of the steel produced in the United States is derived from scrap. With zinc-coated prompt scrap increasing fivefold since 1980, steelmakers are feeling the effect of increased contaminant loads on their operations. Steelmakers are primarily concerned about the cost of treatment before disposal of waste dusts and the water associated with remelting zinc-coated scrap. They therefore need an economical process to strip and recover the zinc from scrap to prepare it for steelmaking. Argonne's process could meet that need.

*(continued)*